The Technology Revolution

In the 1980s, only a few businesses and government organizations were optimistic that technology could be developed to meet the challenge of effectively eliminating the use of ozone-depleting substances. But over the next two decades, the reductions of these substances, called for in the Montreal Protocol, galvanized a global technology revolution.

Corporate Leaders

Companies around the world invested in unprecedented research and development to find ways to eliminate the use of ozone-depleting substances. Creating effective product substitutes or rethinking processes that had been in place for decades was no trivial task. Many factors had to be considered and thoroughly evaluated.

Some businesses took a traditional path—retrofitting equipment, re-engineering products or processes, or finding in-kind replacements. Others found an opportunity to invent completely new technologies or products. These efforts required major corporate investment to develop new technologies, test them, and speed their deployment to the marketplace.

Today, technology is being developed and deployed that protects the ozone layer while saving energy and preventing greenhouse gas emissions.

There are hundreds of examples of important achievements in ozone layer protection. The following are just a few stories from some technology leaders. Many other organizations also made significant achievements in their fields.

SC JOHNSON ELIMINATES USE OF CFCs IN AEROSOLS

SC Johnson A Family Company

One of the first instances of U.S. corporate leadership for protection of the ozone layer occurred on June 18, 1975, twelve years before the Montreal Protocol, when SC Johnson announced its plan for a corporate elimination of CFCs used as aerosol product propellants. Its announcement was also well ahead of the announcement by the federal government that most CFC-based aerosol products for consumers would be banned in the United States. SC Johnson demonstrated that hydrocarbon propellants were more economical and that its customers preferred products that were more protective of the ozone layer. By March 1978, when EPA banned CFCs as propellants in cosmetic products, consumers had already virtually halted the purchase of cosmetic products that contained CFCs.

DUPONT™ LEADS WITH SOUND SCIENCE

DUPONT®

For more than two decades, DuPont™ has provided industrial leadership in the protection of stratospheric ozone. In the 1970s, the company's management made a business decision to invest in good science and conduct its own atmospheric modeling to help decipher the evidence that CFCs were affecting stratospheric ozone. By the time the Montreal Protocol was signed, DuPont™ had already led the chemical industry by abandoning CFCs and developing alternatives. The company helped to form the international Programme for Alternative Fluorocarbon Toxicity Testing (PAFT), through which it invited producers to examine the environmental impacts of the potential new alternatives.

> "The unprecedented progress we have seen in ozone layer protection was a direct result of cooperation among governments, industry, environmental organizations, and scientists worldwide. Industry's innovations sped CFC phaseout while providing essential services such as air conditioning and refrigeration. We are very optimistic that the same spirit of cooperation can carry forward to other environmental issues such as global climate change."
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> —Thierry Vanlancker, Director, DuPont™ Fluorochemicals

Partnerships for Progress

Private and public leaders around the world collaborated to develop and test new technologies to eliminate the need for ozone-depleting substances. These organizations and individuals broke down many technical, institutional, and financial barriers, paving the way for the commercialization and standardization of new materials, products, and processes. In addition, corporate leadership played a key role in the negotiation of the Montreal Protocol phaseout schedules. As a result of this leadership, phaseout targets were more easily achieved.

> "The industry accepted the challenge to protect the ozone layer and managed the transition to new technologies while preserving the significant societal benefits offered by fluorocarbon technologies. The result has been good for the environment, consumers, and the participating industries. The success is unprecedented."
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> — Kevin Fay
> Former Executive Director
> Alliance for Responsible Atmospheric Policy

Multi-Industry Coalition

The Alliance for Responsible Atmospheric Policy, one of the first multi-industry environmental coalitions, was formed in 1980 to address the issue of stratospheric ozone depletion. It represents industry sectors that rely on fluorocarbons (such as CFCs, HCFCs, and HFCs). In 1986, the Alliance called for a global solution to address ozone depletion. In 1992, the Alliance requested the phaseout schedule for CFCs and certain HCFCs be accelerated. The Alliance continues to be a leading industry voice in ozone protection and climate change issues.

Fire Protection

The fire protection sector played a key role in the U.S. transition from first-generation ozone-depleting substances to a variety of similar substitutes (such as HFCs and inert gases) and alternatives (including water, aerosols, and foam) as fire protection agents. Early collaboration by industry, government, and the military to research, develop, and test the alternatives allowed the sector to achieve its dual goals of 1) fire protection to save property and lives and 2) environmental protection for many—and often challenging—applications. Leadership in the revision of national and international industry standards have ensured the adoption of the alternatives and continued worldwide progress away from halons. The sector has also taken steps to reduce emissions of halons during system testing and servicing, and of HFCs used as halon alternatives.

Four fire protection industry organizations developed a Voluntary Code of Practice that encourages its members to follow government regulations and industry standards; limit the use of HFCs for testing and training; and minimize emissions from false discharges and during storage, handling, and transport. The organizations that developed the code are the Fire Equipment Manufacturers' Association (FEMA), the Fire Suppression Systems Association (FSSA), the Halon Alternatives Research Corporation (HARC),

FEMA | the life safety group
Saving Lives, Protecting Property

FSSA
Fire Suppression Systems Association

HARC

NATIONAL ASSOCIATION OF FIRE EQUIPMENT DISTRIBUTORS
NAFED
THE MARK OF PROFESSIONAL SERVICE

and the National Association of Fire Equipment Distributors (NAFED®).

As part of the Voluntary Code of Practice, the sector also created a program known as the HFC Emissions Estimating Program to collect data about HFC emissions from fire protection applications. This program is helping the industry set benchmarks to minimize unnecessary greenhouse gas emissions and document the progress being made.

Air Conditioning and Refrigeration

EPA and the air-conditioning and refrigeration sector have worked closely to find acceptable substitutes for the use of CFCs as coolants in household and car air conditioners and commercial refrigeration systems. In 2006, EPA and the Air-Conditioning and Refrigeration Institute joined forces to minimize the use of HCFCs and HFCs in the manufacture of more than 8 million residential and commercial air-conditioning units and refrigeration systems annually. HCFCs are far less damaging to the ozone layer than CFCs, and HFCs are not ozone-depleting substances. However, both HCFCs and HFCs are greenhouse gases. EPA and the Association of Home Appliance Manufacturers took this into account and agreed to work together to significantly reduce HFC emissions during the manufacturing of 12 million refrigerator-freezers in the United States and more than 60 million worldwide each year.

The partnerships plan to reduce HCFCs and HFCs emissions during all stages of production, including delivery, storage, transfer of refrigerants and system charging, testing, and refrigerant recovery. The guidelines provide a framework for protecting the global environment beyond current mandates through advanced technologies.

Motor Vehicle Air Conditioning

Prior to 1994, most air-conditioning systems used in cars and other vehicles required CFC refrigerants. While vehicles manufactured in 1995 and later do not use CFCs in their air-conditioning systems, many older cars still require them for servicing. Industry partners have developed procedures to retrofit cars to use alternative refrigerants, such as HFC-134a, and to reduce the amount of refrigerant leaked into the air during servicing.

SAE International™, Delphi, and the Mobile Air Conditioning Society (MACS), together with EPA, established a precedent-setting servicing procedure using new technology that allows for onsite recovery and recycling of motor vehicle air-conditioning refrigerant. The procedure prevents millions of pounds of refrigerant from being released to the environment and enables it to be reused, thereby reducing the need for new refrigerant. Automobile manufacturers worldwide have approved this process and allowed it to be covered under vehicle warranties. It has also been adopted for HFC-134a refrigerant, which is used in modern car air-conditioning systems.